

CLAIMS

1. An apparatus (1) for accurately metering out powder, comprising:
 - 5 - a container (2) of powder (3), comprising an adjustable opening (4A, 4B) through which the powder (3) is dispensed, said opening (4A, 4B) being in direct communication with the container (2);
 - 10 - adjusting means (5) for adjusting said opening (4A, 4B); and
 - 15 - a checking means (6) for checking the amount of powder (3) dispensed, in relation with said adjusting means (5); and
 - 15 - a vibrating (27) and/or tapping (28) means for vibrating or tapping the container (2).
2. The apparatus (1) as claimed in claim 1, able to dispense powders with an accuracy of 100 µg or better, preferably with an accuracy of 50 µg or better, and more preferably still with an accuracy of 10 µg or better.
3. The apparatus (1) as claimed in one or other of claims 1 and 2, able to dispense powders with a mean accuracy of 0.5 mg or better, preferably with a mean accuracy of 0.2 mg or better, and more preferably still with a mean accuracy of 0.1 mg or better.
- 30 4. The apparatus (1) as claimed in any one of claims 1 to 3, in which the opening (4A, 4B) can be adjusted to the extent of being completely closed off.
- 35 5. The apparatus (1) as claimed in any one of claims 1 to 4, in which the opening (4A, 4B) is in the shape of a triangle.
6. The apparatus (1) as claimed in any one of claims

1 to 5, in which the opening (4A, 4B) is chosen from an opening with a plug valve (4A, 4B) or an opening with a slide valve (4A, 4C).

5 7. The apparatus (1) as claimed in any one of claims 1 to 6, in which the container (2) comprises a receptacle part (8) and a stopper part (9).

10 8. The apparatus (1) as claimed in any one of claims 1 to 7, in which the container comprises a hopper (14) feeding the opening (4A, 4B).

15 9. The apparatus (1) as claimed in any one of claims 1 to 8, in which the adjusting means (5) are controlled by software as a function of checking measurements supplied by the checking means (6).

20 10. The apparatus (1) as claimed in any one of claims 1 to 9, in which the adjusting means (5) comprise a motor connected to a transmission element (11) actuating the opening or closure of the adjustable opening (4A, 4B).

25 11. The apparatus (1) as claimed in any one of claims 1 to 10, in which the checking means (6) is a balance having a weighing accuracy of 0.1 mg or better.

30 12. The apparatus (1) as claimed in any one of claims 1 to 11, in which the means (28) for tapping the container (2) is a retractable finger that strikes the outside of the container (2).

35 13. The apparatus (1) as claimed in any one of claims 1 to 12, in which the container (2) further comprises a stirrer (12) situated within the interior volume of said container (2).

14. The apparatus (1) as claimed in claim 13, in which said stirrer (12) comprises a rotary drill arranged

along an axis passing through the opening (4A, 4C) and more or less normal thereto, said drill comprising:

- a first end situated near the opening (4A, 4C), said first end having a screw thread able to convey the powder toward the opening (4A, 4B),
- a second end at the opposite end to the first end, said second end being fixed to a rotor,
- paddles fixed to the drill and projecting radially from the axis of rotation.

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15. The apparatus (1) as claimed in claim 13, in which said stirrer (12) is arranged along an axis passing through the opening (4A, 4B), said stirrer (12) comprising:

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- a first end (12A) arranged near the mid-plane of the opening (4A, 4B), and
- a second end (12B) at the opposite end to the first end (12A) and which is connected to a device transmitting to the stirrer (12) a back-and-forth movement along said axis passing through the opening (4A, 4B), and possibly a rotary movement about said axis passing through the opening (4A, 4B).

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16. The apparatus as claimed in claim 15, in which the stirrer (12) is a rod (16).

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17. The apparatus as claimed in claim 15, in which the first end (12A) of said stirrer (12) comprises a rod (16) and the second end (12B) of said stirrer (12) comprises a leaf (15) bent back on itself to form a loop that is elongate along said axis passing through the opening (4A, 4B), said leaf (15) comprising fins (15A) which project from the interior surface of the bent-over leaf (15) toward said axis.

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18. The apparatus as claimed in any one of claims 15 to 17, in which the device transmitting a back-and-forth movement to the stirrer comprises:

- a transmission means (17) connected to the second end (12B) of the stirrer (12),
- a pushing means (21),
- a pulling means (18),

5 said pushing means (21) transmitting a translational movement to said transmission means (17) in a first direction along the axis of said transmission means (17) and said pulling means (18) transmitting a translational movement to said transmission means (17)

10 in the opposite direction to the first direction.

19. The apparatus as claimed in any one of claims 15 to 18, in which the device transmitting a rotary movement to the stirrer comprises a transmission means (17) connected to the second end (12B) of the stirrer (12), said transmission means (17) comprising driving gearing (22) which is driven by drive gearing (23) fixed to a motor (24).

20 20. The apparatus (1) as claimed in any one of claims 15 to 19, in which:

- the first end (12A) of said stirrer (12) comprises a rod (16) and the second end (12B) of said stirrer (12) comprises a leaf (15) bent back on itself to form a loop that is elongate along said axis passing through the opening (4A, 4B), said leaf (15) comprising fins (15A) which project from the interior surface of the bent-over leaf (15) toward said axis,
- the device transmitting a back-and-forth movement to the stirrer comprises a transmission means (17) connected to the second end (12B) of the stirrer (12), a pushing means (21), a pulling means (18), said pushing means (21) transmitting a translational movement to said transmission means (17) in a first direction along the axis of said transmission means (17) and said pulling means (18) transmitting a translational movement to said transmission means (17) in the opposite direction

to the first direction,

- the device transmitting a rotary movement to the stirrer comprises a transmission means (17) connected to the second end (12B) of the stirrer (12), said transmission means (17) comprising driving gearing (22) which is driven by drive gearing (23) fixed to a motor (24).

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21. The apparatus (1) as claimed in any one of claims 10 12 to 20, in which the tapping means and/or the stirrer (12) are controlled by software as a function of checking measurements supplied by the checking means (6) and possibly as a function of characteristics of the powder (3).

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22. The apparatus (1) as claimed in any one of claims 1 to 21, in which the container (2) further comprises a scraper (13), preferably a curved blade or a rotary brush.

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23. A method for accurately metering out powders employing the apparatus as claimed in any one of claims 1 to 22, comprising one or more of the following steps:

- bringing the container (2) into the metering position,

- using the adjusting means (5) to open the adjustable opening (4A, 4B),

- possibly vibrating or tapping the container (2),

- using the checking means (6) to measure the amount 30 of powder (3) dispensed,

- using the adjusting means (5) to open or close the adjustable opening (4A, 4B) as a function of the measurement returned by the checking means (6),

- adjusting the means that vibrate and/or tap the container (2) as a function of the measurement 35 returned by the checking means (6).

24. The use of an apparatus (1) as claimed in any one of claims 1 to 22 for accurately metering out powder.